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- (71) Applicant: MONSANTO COMPANY [US/US]; 800 N. Lindbergh Boulevard, St. Louis, MO 63167 (US). (72) Inventors: HAUGE, Brian, M.; 17 Clifton Avenue, Beverly, MA 01915 (US). WANG, Ming, Li; 312 Lowell Street, Lexington, MA 02420 (US). PARSONS, Jeremy, D.; 37 Walpole Road, Cambridge CB1 3TH (GB). PAR- NELL, Laurence, D.; 9 Eustis Street #2L, Cambridge, MA 02140-2226 (US).
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- (54) Title: NUCLEIC ACID MOLECULES AND OTHER MOLECULES ASSOCIATED WITH SOYBEAN CYST NEMATODE RESISTANCE

rhg 1 LRR

consensus LRR	L	F	S	N	L	P	N	L	E	E	L	D	L	S	N	N	L	T	S	L	P	P	G	
	a	x	x	a	x		x	L	x	L	x	L	x	x	N		L		I					
LRR 177-200	T	L	G	L	L	P	G	L	R	K	L	S	H	D	N	Q	I	G	G	S	I	P	S	
LRR 201-224	S	L	G	F	C	P	N	L	R	G	V	Q	L	F	N	N	R	L	T	G	S	I	P	L
LRR 225-248	L	A	N	S	T		L	L	Q	S	L	D	L	S	N	N	L	L	T	G	A	I	P	S
LRR 249-272	L	T	H	S	F		K	L	Y	W	L	N	L	S	F	N	S	F	S	G	P	L	P	A
LRR 273-297	W	G	G	N	S	K	S	L	T	F	L	S	L	Q	N	N	N	L	S	G	S	L	P	N
LRR 302-325	L	G	S	L	R		R	L	Q	N	L	I	L	D	H	N	F	F	T	G	D	V	P	A
LRR 326-349	I	G	T	L	S		E	L	N	E	L	S	L	S	H	N	K	F	S	G	A	I	P	N
LRR 350-373	T	L	S	N	L	S	R	L	K	T	L	D	I	S	N	N	A	L	N	G	N	L	P	A
LRR 374-397	S	L	G	R	L	R	S	L	T	L	N	A	E	N	N	L		L	D	N	Q	I	P	Q
LRR 398-421	S	I	A	N	I	S	N	S	V	L	I	L	S	R	N	Q		F	S	G	H	I	P	S
LRR 422-445	S	F	D	S	Q	R	S	L	R	Q	L	D	L	S	L	N	N	F	S	G	E	I	P	V
LLR 446-470	L	L	A	K	F	N	S	L	N	L	F	N	V	S	N	S	N	L	S	G	S	V	P	P

(57) Abstract: The present invention is in the field of soybean genetics. More specifically, the invention molecules from regions of the soybean genome, which are associated with soybean cyst nematode resistance. The invention relates to proteins encoded by such nucleic acid molecules as well as antibodies capable of recognizing them. The invention also relates to nucleic acid markers from regions of the soybean genome, which are associated with soybean cyst nematode resistance. Moreover, the invention relates to uses of such molecules, including, transforming soybean cyst nematode constructs containing nucleic acid molecules from regions of the soybean genome, which are associated with soybean cyst nematode resistance. Furthermore, the invention relates to the use of such molecules in a plant breeding program.

WO 01/51627 A2

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# NUCLEIC ACID MOLECULES AND OTHER MOLECULES ASSOCIATED WITH SOYBEAN CYST NEMATODE RESISTANCE

## FIELD OF THE INVENTION

The present invention is in the field of soybean genetics. More specifically, the invention relates to nucleic acid molecules from regions of the soybean genome, which are associated with soybean cyst nematode (SCN) resistance. The invention also relates to proteins encoded by such nucleic acid molecules as well as antibodies capable of recognizing these proteins. The invention also relates to nucleic acid markers from regions of the soybean genome, which are associated with SCN resistance. Moreover, the invention relates to uses of such molecules, including, transforming SCN sensitive soybean with constructs containing nucleic acid molecules from regions in the soybean genome, which are associated with SCN resistance. Furthermore, the invention relates to the use of such molecules in a plant breeding program.

## BACKGROUND OF THE INVENTION

The soybean, *Glycine max* (L.) Merril (*Glycine max* or soybean), is one of the major economic crops grown worldwide as a primary source of vegetable oil and protein (Sinclair *et al.*, *Compendium of Soybean Diseases*, 3<sup>rd</sup> Ed. APS Press, St. Paul, MN, p. 106. (1989)). The growing demand for low cholesterol and high fiber diets has also increased soybean's importance as a health food.

Cultivars were either direct releases of introductions locally diverse plant introductions. A crop in the early part of the 19th century. Two-seeded types useful for feed grain and oil production. In the 1960's, gains in soybean seed yields were achieved by using method from evaluation and selection of introduced germplasm to mate by elite lines. The continuous cycle of cross hybridizing the elite strains selected from the progenies of previous crosses resulted in the modern day cultivars.

ed...-1-program  
ated with soybean Cyst nematode  
nematode resistant soybean with  
ase proteins. The invention also  
relates to nucleic acid  
molecules. The invention also  
to 10<sup>40</sup>

What is claimed is:

1. A method for the production of a soybean plant having an *rhg1* SCN resistant allele comprising:
  - (A) crossing a first soybean plant having an *rhg1* SCN resistant allele with a second soybean plant having an *rhg1* SCN sensitive allele to produce a segregating population;
  - (B) screening said segregating population for a member having an *rhg1* SCN resistant allele with a first nucleic acid molecule capable of specifically hybridizing to linkage group G, wherein said first nucleic acid molecule specifically hybridizes to a second nucleic acid molecule that is linked to said *rhg1* SCN resistant allele; and,
  - (C) selecting said member for further crossing and selection.
2. The method for the production of a soybean plant according to claim 1, wherein said first nucleic acid molecule is capable of specifically hybridizing to said second nucleic acid molecule having the nucleic acid sequence of SEQ ID NO: 2, 3, complements thereof, or fragments thereof having at least 15 nucleotides.
3. The method for the production of a soybean plant according to claim 1, wherein said first nucleic acid molecule is capable of specifically hybridizing to said second nucleic acid molecule having the nucleic acid sequence of SEQ ID NO: 5 or 6, complements thereof, or fragments thereof having at least 15 nucleotides.
4. The method for the production of a soybean plant according to claim 1, wherein said first nucleic acid molecule is a nucleic acid marker capable of detecting *rhg1* haplotype 2 or 4.
5. The method for the production of a soybean plant according to claim 1, wherein said first nucleic acid molecule is capable of specifically hybridizing to a nucleic acid molecule having a sequence that is present on linkage group G within 100kb of said *rhg1* SCN sensitive allele.
6. The method for the production of a soybean plant according to claim 5, wherein said first nucleic acid molecule is capable of specifically hybridizing to a nucleic acid molecule having a sequence that is present on linkage group G and located within 50kb of said *rhg1* SCN sensitive allele.

Rhg1 LRR

consensus LRR	L F S N L P	N L E E L D L S N N	L T	S L P P G
	a x x a x	x L x x L x L x x N	L	I
LRR 177-200	T L G L L P	G L R K L S L H D N Q	I G	G S I P S
LRR 201-224	S L G F C P	N L R G V Q L F N N R	L T	G S I P L
LRR 225-248	L A N S T	L L Q S L D L S N N L	L T	G A I P Y S
LRR 249-272	L T H S F	K L Y W L N L S F N S	F S	G P L P A S
LRR 273-297	W G G N S K	S L T F L S L Q N N N	L S	G S L P N S
LRR 302-325	L G S L R	R L Q N L I I D H N F	F T	G D V P A S
LRR 326-349	I G T L S	E L N E L S L S H N K	F S	G A I P N E
LRR 350-373	T L S N L S	R L K T L D I S N N A	L N	G N L P A
LRR 374-397	S L G R L R	S L T L L N A E N N L	L D	N Q I P Q
LRR 398-421	S I A N I S	N L S V L I L S R N Q	F S	G H I P S
LRR 422-445	S [F] D S Q R	S L R Q L D L S L N N	F S	G E I P V
LRR 446-470	L L A K K F N S L N	L F N V S N S	L S	G S V P P

Figure 1

Rhg4 LRR

consensus LRR	L F S N L P	N L E E L D L S N N	L T	S L P P G
	H V T S I S L A S H S	L T	G T L P S D	
LRR 34-57			L	G T L P S
LRR 58-80	L N S L S	Q L R T L S L Q D N S	F S	S V P T
LRR 81-104	L S N L S	F L Q T V Y [L] N R N N	A L Q P W S F P T D	
LRR 105-130	A F A S L T	S L Q T L S L G S N P	L T	G P L P D I
LRR 131-154	L T S S S	N L I D L D L A T V S	L T	G N L P S S
LRR 155-178	F D K F P	S L Q H L R L S Y N N	G T L L	
LRR 179-203	F S A A N	N L E T L W L N N Q A A G L S	L T	G V V P A
LRR 227-250	L S N M S	A L S D L Q L R D N Q	L Q	G P V P V
LRR 251-274	S L T S L P	S L K K V S L D N N E	L Q	G T I S P
LRR 333-356	F G K G V N	K I I T V N F E K Q G	L I	G S I P D
LRR 357-380	A F A N L T	D L R T L F L N G N N	L S	G L V P K
LRR 381-404	S L I T L P	Q L Q T L D V S D N N	F P P K V K	

Figure 2